THE IMPACT OF DISCHARGE WATER AND THE MOVEMENT OF MARITIME

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ABSTRACT

The study aims to discuss about discharge water and their impact of the maritime movements. The discharge water study focus on the ballast water and their impacts. The study includes on the effect of discharge water to human and environment. The data preferred in these study are from a secondary data that collected from books, journal and article. These secondary provide much more information from previous studies and the related collection.

Keywords

Discharge water, ballast water, maritime movement, impacts.

1.0 INTRODUCTION

Discharge water was classified as water pollution. Although the discharge water problem happened in small cases but it still give an impact to the maritime movement. According to Clean Water Act, section 502, it declare that "discharge" means applied without permission. However, in Section 502 (20), pollution means chemical , physical, biological or radiological that produce was a persistent, manufactured or processed solid material discarded, disposed of or abandoned in marine and coastal environmental.

Discharge water also causes a negative effect to the environmental, economic and health. Regarding to United Nations Environment Programmer (UNEP), effects of discharge water are entanglement and ingestion to the marine animals, marine organisms and seabirds. It also creates damage to property and livelihood. However, the primary objective is to study about the impact of discharge water and the maritime movement.

Discharge water on ballast water used by ship to adjust their stability and trim when sailing without cargo or only partially laden. Until around 1850 ballast tended to be solid material such as soil, sand, gravel or rocks. Shipping industry was used ballast water concept around 1850 and since 1870's the transport of seawater also worked as ballast has become common practice (Carlton, 1985).

2.0 LITERATURE REVIEW

The study focus on ballast water impacts and movements of maritime. Ballast water was one of the discharge water in maritime that required an urgent response. The shipping vessel could not operate without ballast water, because it provides balance and stability of vessel (Figure 1). However, the ballast water give impact to the environment because its contains aquatic life. The impact of ballast water was divided into three types which is ecological impact, economics impacts and human health impacts.

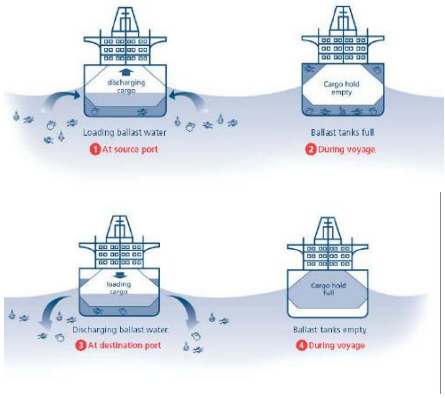


Figure 1: Ballast water cycle (Source: GloBallast Programme, IMO)

2.1 Ecological impact

There are another aquatic life inside of ballast water. During the vessel loads their cargo, it was release the ballast water into the sea and this situation had create a competence between micro organism and native species for altering the habitats. However, the important effect of ballast water to ecology was harmful aquatic bio-invasions and irreversible unlike oil spills. In oils spills casses, the impacts was decreased quickly, clean up and rehabilitation activities are undertaken.

However, an aquatic bio-invasion, the initials impacts may be no existents and invisible.

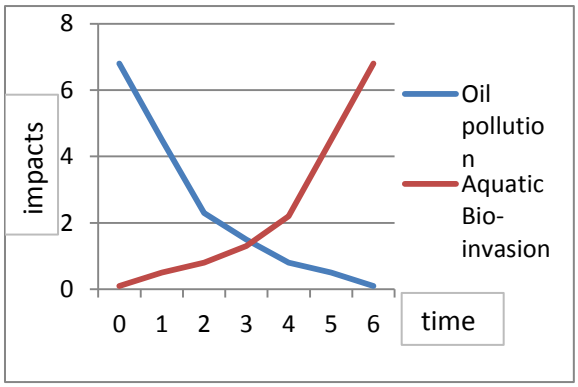


Figure 2: Impacts over tome, major oil spill versus aquatic bio-invansion (Source: Global Ballast Water management Programme)

2.2 Economic impacts

Aquatic bio-invension caused by ballast water had damaged the native species. This situation had effect the economic and society loses includes the reductions in marine productions and human health. Study shown the invasive species such as zebra mussel *Dreissena polymorpha* a bivalve was brought from Europeon to U.S aquatic ecosystem by ballast water. The new invasive had increased rapidly in water clarity in the lakes and decrease the numbers of native species and their habitats. This problem had decreased the income and economic loses to human and countries. The introduced to algae and the closure of recreational and tourism due to fouled by harmful algae bloom (figure 3) was another example of economic impacts of invasive aquatic species.

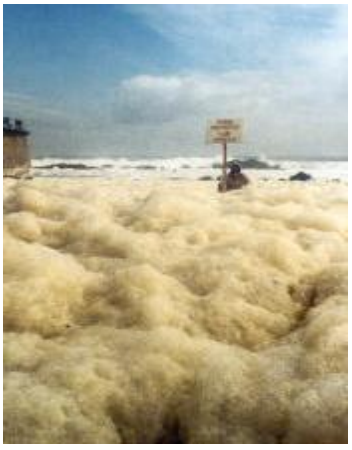


Figure 3: Mucus generated by a harmful algae bloom fouling a beach and making it unusable (Source: The Argus)

2.3 Human health impacts

Maritime industry was recognized as international transport for disease as public health threat. (Casale, 2002). So, human health impacts caused from ballast water detected early fourteenth century was understood separates plague epidermics moved along maritime trade routes. For example, cholera epidermics appear to directly with ballst water when it simultaneously attack three separate ports at Peru in 1991, across South America, and infected more than million people and killing more than ten thousand people by 1994.

3.0 RESEARCH METHODOLOGY

The data using into this research are secondary data that collected from books, journal and article. Some data also collected from internet (web-based) organization that approved. These secondary data was helped in give extra information about this topic along the study.

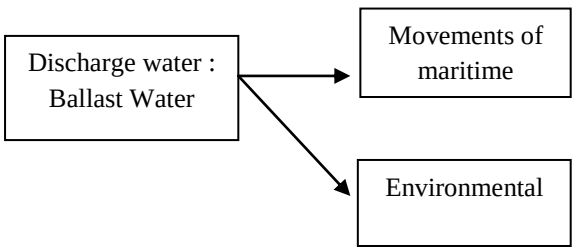
The study is using qualitative comparative analysis. Qualitative comparative analysis is a new technique that allows scholars studying macro-social phenomena to use Boolean algebra. The main advantage of this new technique is that it permits combination of the intensity derived typically from qualitative methods with the larger number of observations that is normally used in quantitative methods.

4.0 FINDINGS

4.1 Theorical framework and discussion

Discharge water such as ballast water was effects the movements of maritime. However, ballast water needed to balancing and stabilize their ship. The ballast water create a fouling ecosystem, and discharge it into the sea during load cargoes. On that time, it also discharge the dust, domestic waste or chemical and biological material that provided from the vessel and these were affect pathways of the ship and caused thedeepth water became shallow.

The discharge water also give an impact to the environmental like ecological impact, human health and economic impact include maritime industry.



Shipping carriers more than 80% of the world trade and process 12 billion tonnes of ballast water per year. Over last two hundred years the rate of aquatic bio-invasion had increased at an exponential rate and there is no sign of levelling off (Carlton 2001), (Figure 4)

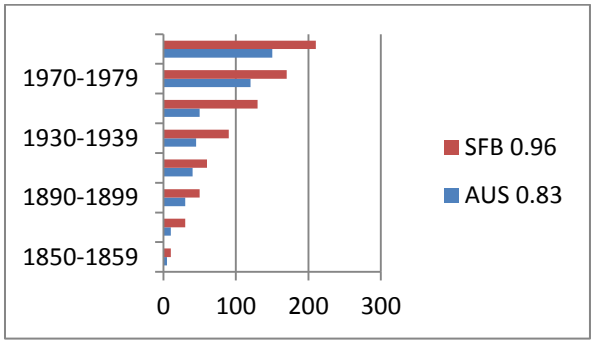


Figure 4: The exponential increase of marine bio invansions. Cumulative number of invansive species in San Francisco Bay (SFB) and Australia (AUS) (Source: CSIRO Australia)

There are 15 categories of vectors that transport by marine organism from shallow coastal waters. (Table 1). However, ballast water donate the higher percentage of aquatic bio-invasion attacked the invasive species. Historically, vectors had included hull fouling, dry and semi-dry ballast, ballast water, unintentional introductions associated with the importation of mariculture species, and deliberate introductions of exotic species of mariculture. For example, at San Francisco Bay, there were four vectors impact marine was ship fouling, ballast water, accidental introductions due to mariculture, and deliberate introductions.

Source	**Vector**	**Target taxa**
Commercial Shipping	Ballast water	Plankton, nekton, benthos in sediments
	Hull Fouling	Encrusting, nestling, and some mobile species
	Solid Ballast (rocks, sand, etc.)	Encrusting, benthos, meiofauna and flora

Table 1: Anthropogenic vectors for marine introductions (Source: Marine Policy)

Figure 5 shown the measurement of relative importance of the different types of transport vectors is the proportion of invasive species was atributed.

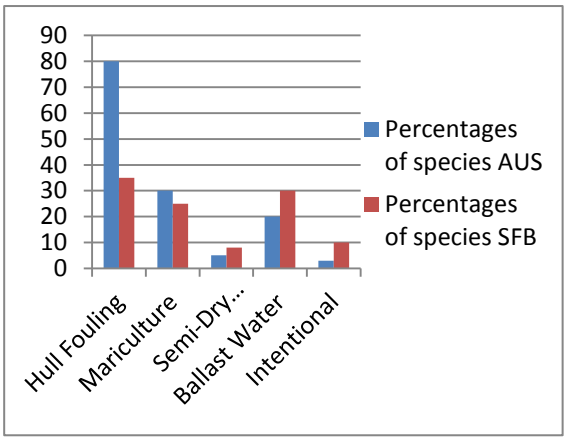


Figure 5: Probable mechanism of invansion for known introduced species in Australia and San Francisco Bay based on life history characteristics. (Source: Marine Policy)

5.0 DISCUSSION

Ballast water had interrupted the movement of maritime. Because of the discharge water, the deepth water at port was increase. Hence, a vessel cannot anchoring their ship nearest with the port. These situation was impact to the vessel cost of using tug boat. Moreover, ballast water also caused accident because during the discharge, the water included chemical, soil, sand, rock or else. These thing would caused damaged to the propeller of the ship during operation.

Hence to reduce these impacts, some regulations and laws had to follow. For example:

- IMO GloBallast program had to be extended to the region. It would be effective way forward, by assist economies to adapt the IMO Guidlines for the Control and Management of Ships' Ballast Water.
- Support the IMO Convention for the Control and Management of Ships' Ballast Water and Sediments (2003).
- Cooperation between all countries and shipping and port industry are needed such as APEC.

6.0 CONCLUSION

Discharge water by ballast water was impact to the ecology cycle and movement of maritime. The invasive species was attacked and damaged by fouling ecosystem that causes of viruses spread widely, and slowed the movement of maritime. These vector are responsible for introducing some of the most damaging invasive species. These

species problem was getting worst but the environmental, social and economic risks, and the negative impacts on people well being was still growth. Its still being largely ignored by government and environmental interest groups.

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